



**City of Chicago**  
**Richard M. Daley, Mayor**

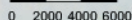


## **Residential Sound Insulation Program**

**Thomas R. Walker**  
**Commissioner of Aviation**

# **Sound Insulating Your Home**





# Welcome

The City of Chicago Department of Aviation and the O'Hare Noise Compatibility Commission (Commission) are pleased to present you with this guidebook on sound insulating your home. The genesis for development of this guidebook came in response to requests from residents in municipalities near the airport that desire to insulate their homes to reduce the impact of aircraft and other noise sources. This booklet is the product of research and review by the City's Department of Aviation, Airport Owners Representatives, the city's consultant to the Residential Sound Insulation Program, and the Commission's Residential Sound Insulation Committee.

The O'Hare Noise Compatibility Commission was created by Chicago Mayor Richard M. Daley in 1996 to bring a fresh, non-confrontational approach to addressing jet noise issues at O'Hare International Airport. Creation of the Commission resulted from an unprecedented commitment to share decision-making with regional leaders in implementing effective and permanent noise reduction programs. The Commission's membership as of 1996 consists of:

Arlington Heights	Northlake	School District 81
Chicago	Oak Park	School District 84
Cook County	Palatine	School District 84.5
Des Plaines	River Forest	School District 86
Elmwood Park	River Grove	School District 87
Franklin Park	Rolling Meadows	School District 212
Hoffman Estates	Rosemont	School District 214
Melrose Park	Schaumburg	School District 234
Mount Prospect	Stone Park	School District 299
Niles	School District 59	School District 401
Norridge	School District 80	

Through its Committees and programs, the Commission brings to the same table all the parties that are most able to reduce aircraft noise including: city and suburban leaders, the Federal Aviation Administration, the airlines, pilots and air traffic controllers. Together, we are working on solutions to reduce the impacts of aircraft noise.

We hope you find the information on the pages to follow useful and comprehensive. To further guide you in your endeavor, a listing of material manufacturers who currently provide sound-attenuating products to the program is provided on the back cover. Please contact them for material specifications and local distributors. The Department of Aviation and the O'Hare Noise Compatibility Commission appreciate the opportunity to provide this information and look forward to continuing our efforts to improve the quality of life for O'Hare's neighbors.

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# Introduction

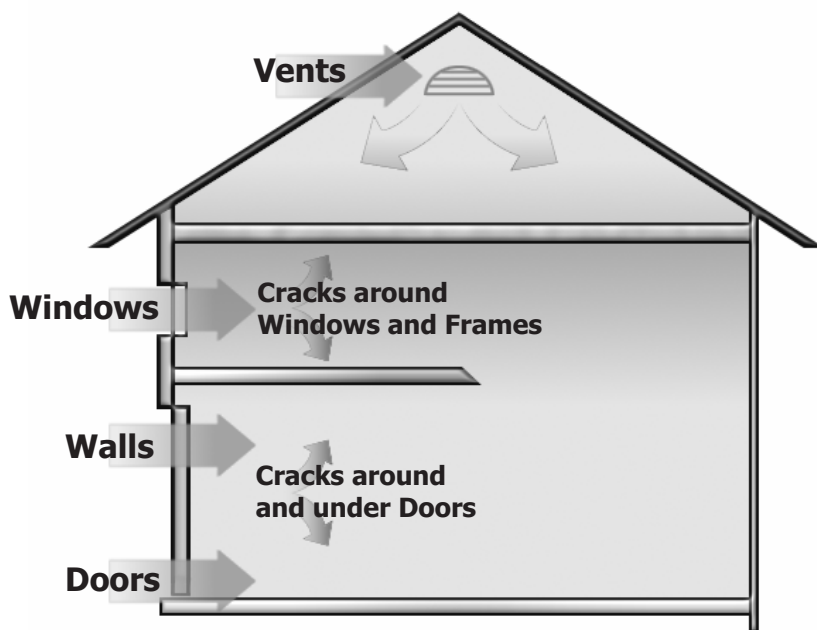
Noise enters your home in the same way air enters - through cracks and openings in your home's exterior. Sound insulating your home is merely sealing up the points of air entry and in some cases increasing the mass through which noise must travel. The City of Chicago has been conducting a Residential Sound Insulation Program (RSIP) since 1996. Under this program, homes are selected for the RSIP based on their locations within a noise contour.

A noise contour is generated by compiling all the aircraft flight information for an entire year. This information is entered into a computer that calculates noise levels, and generates a noise contour map which displays the day/night average noise level (DNL) in areas surrounding the airport. A ten decibel penalty is added to all flights between 10 p.m. and 7 a.m. due to the additional disturbance of nighttime activity. This computer generated noise contour must then be reviewed and accepted by the Federal Aviation Administration before it can be used as the basis of the RSIP. For a single-family, owner occupied home to be considered for inclusion in the City of Chicago's RSIP, it currently must be located within the 70 DNL or greater noise contour.

This booklet outlines some of the things you can do to your home to decrease the effects from aircraft noise. You may be able to do some of these things yourself rather inexpensively. However, some items are more difficult and may require the work to be performed by professionals. In some cases, we have provided a brief overview of guidelines for installation. ***Please understand, however, this is not an installation procedure manual.***

The modifications in this booklet are sequenced in order of greatest sound reduction benefit category to least sound reduction benefit. However, all modifications should give some sound insulation relief.

The following graphic shows some of the points of entry for air and noise:



### **Three Major Paths for Noise Transmission**

- Gaps and Cracks
- Windows and Doors
- Walls and Roof Vents

# Windows

Old, loose fitting windows that may rattle when a plane goes overhead or a truck or train passes are probably the greatest source of noise transmission in a home since the windows are in every room. Quality windows, installed in accordance with sound reduction construction procedures will give you the greatest benefit. If you do not wish to purchase new windows, adding storm windows or merely sealing your existing windows will help alleviate some air and noise transmission.

## Replacement Windows

The windows being used in the City of Chicago's Residential Sound Insulation Program are acoustically-rated windows with an STC (sound transmission coefficient or a materials ability to resist sound transmission) rating of 40 to 44, depending on the homes proximity to the airport. A window with a sound transmission rating of 40 can be a thermo pane window (2 panes of glass with an air space between the windows) and a storm window attached. The combination of the glass and the air spaces give the windows the acoustical rating. The STC 44

window is constructed the same, however, one of the panes of glass is made of laminated glass. These windows are quite expensive and there are only a few manufacturers in the United States who have submitted all the acoustical and thermal testing reports required to manufacture them.





The Chicago area has several window manufacturers of good quality thermo pane windows that will provide some noise relief. If you purchase thermo pane windows that do not have the storm windows built into the window unit, you should make sure they have wood or metal frames. This ensures that a storm window can be placed over the unit now or at a later date. ***Placing a storm window over a window with a vinyl frame may cause the vinyl to warp and void your window warranty.***

As important as the quality of the window itself, is the method of installation. Most window installers do not install windows following sound reducing techniques. To obtain the full acoustical benefit, all voids around the windows must be filled with insulation and wood blocking, and the perimeter of the windows must be thoroughly caulked so no air can leak through. Since this is not a typical window installation, you may want to have your purchase agreement with the window company state that the windows will be installed in accordance with *Details W1 and W2 included in this booklet*. This will give you the greatest sound reduction benefit from your new windows.



## **Storm Windows**

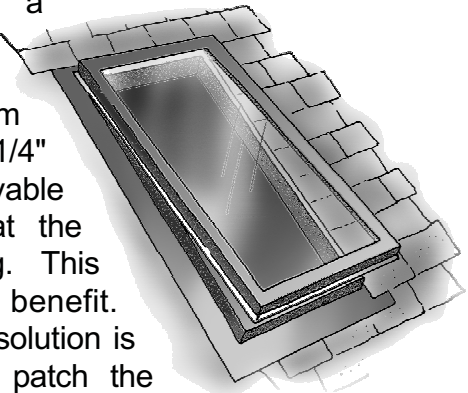
The combination of glass and air spaces increases the acoustical rating of window units. The addition of storm windows over your existing windows will increase the acoustical rating. Again, it should be noted that storm windows should not be installed over vinyl framed windows. The heat build up from the sun between the panes of glass may cause the vinyl to warp. Acoustical storm windows are usually constructed with 3/16" or 1/4" laminated glass. Storm windows with regular or double strength glass are helpful but will not greatly reduce the noise transmission.

## **Maintenance to Existing Windows**

Ill-fitting windows that rattle are a source of air and noise infiltration. Replace any pieces of glass containing cracks. Apply a thin bead of clear silicone caulk around the glass to secure the glass to the frame. Apply caulk around the window frame to prevent air and noise from leaking in around the window.

## **Skylights**

Sound is decreased when it has to travel through mass. By adding a skylight, the mass of the shingles, roof decking and insulation are replaced with a sheet of glass. The only thing that can be done to a skylight is to install an interior storm window, which is merely 1/4" laminated glass in a removable wood or aluminum frame at the bottom of the skylight opening. This will add some acoustical benefit. However, the best acoustical solution is to remove the skylight and patch the opening to match the existing materials.



# Doors

The second most common place for air and noise to enter your home is through and around worn, loose-fitting doors. A prime door and a storm door act much like the thermo pane windows and storm windows in that the combination of the doors with the air space between increases the acoustical integrity of the unit. The installation of new doors with weatherstripping, a new threshold and a bottom sweep will give you the greatest benefit, however, any of the following modifications will give you some decrease in noise infiltration.

## Replacing Prime Doors

Pre-hung wood solid-core doors should be used. Steel or metal doors are generally not acoustically acceptable because they are constructed of a thin outer layer of metal filled with cork or foam and do not have sufficient mass to provide adequate sound reduction. A pre-hung door has less tendency to warp than a solid core door that is installed into an existing frame. The installation technique should include removing the existing door, jamb and; filling all voids around the door with wood blocking and insulation; and installing the pre-hung unit. (See *Details D1 and D3 on pages 22 and 24 for the proper method of installation.*) Weatherstripping should be applied around the top and side frames, and a sweep installed on the bottom of the door.



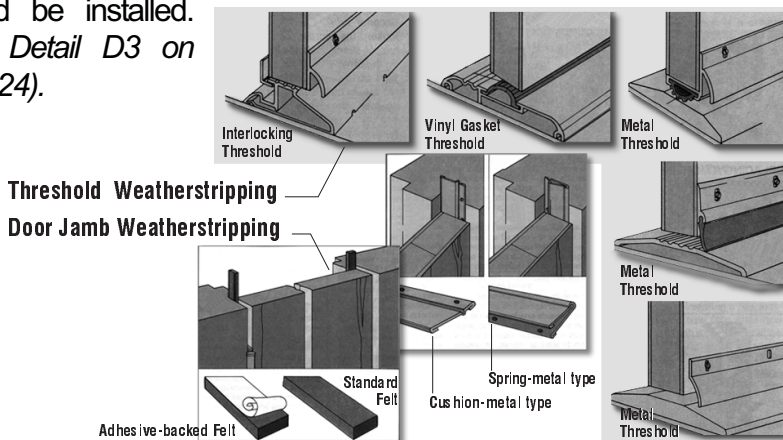
## Replacing Storm Doors

Solid core aluminum storm doors with 3/16" thick laminated glass provide the best acoustical properties. However, any aluminum storm door with weatherstripping around the perimeter and a sill sweep will help block sound transmission. Keep in mind that a storm door only has acoustical benefit when the storm window is in place. If the homeowner wants to have the door function as a ventilating unit, it is recommended that storm doors with self-storing screens be installed. (See Detail D2 on page 23.)

## Weatherstripping Existing Doors

To close a properly weatherstripped door, you will have to push or pull it shut. It will not easily swing shut since the weatherstripping is forming a seal that prevents air and noise infiltration. It is important that weatherstripping be applied on both the prime and the storm doors. Most hardware stores and lumber yards carry weatherstripping intended for homeowner installation. We recommend that the weatherstrip be of sufficient thickness to compress at least 3/8" when the door closes against it. To check existing weatherstripping, close the door from the inside and carefully inspect the entire perimeter of the door where it meets the frame and sill. There should be no light visible. If there is, the weatherstrip must be adjusted until no light is visible or new weatherstripping should be installed.

(See Detail D3 on page 24).



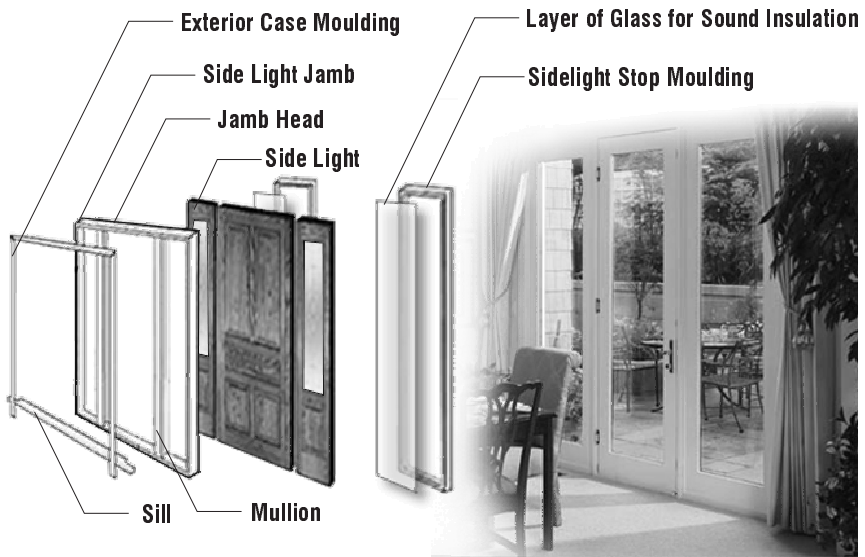


## Door Maintenance

Cracks in doors should be filled in, sanded and covered with paint or an exterior grade stain sealer. If there is a window in a door, apply a thin bead of clear silicone caulk around the perimeter of the window. Apply caulk around the door frame and jamb.

## Sidelights

An additional layer of glass should be added to sidelights, if they are not currently in vinyl frames. A storm window or glass in a frame should be added to either the interior or exterior of the sidelight. There should be a 1" - 2" air space between the existing and the new glass. To assure water will not get in between the layers of glass, caulk the perimeter of the glass and the perimeter of the frame. *(See Detail W3 on page 21.)*



# Wall Modifications

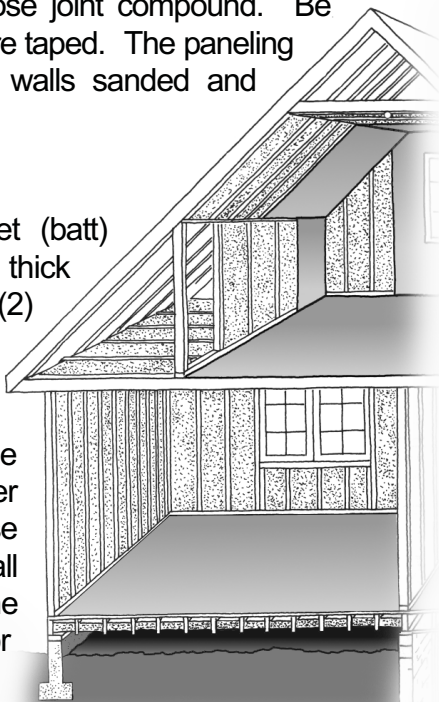
Many times paneling is installed directly to wall studs. This is commonly found in home additions. On exterior walls, paneling alone is not a sufficient wall mass and noise will be readily transmitted into the home. There are different recommended sound insulating modifications depending on the noise contour (DNL) in which the home is located. Wall board should be fastened to studs as follows: 1 1/4" length screws for first layer and 1 5/8" length screws for second layer. Please reference your home's location in the DNL contour located inside the front cover of this handbook, for specification recommendations:

## Below 75 DNL

Remove paneling, install blanket (batt) insulation (R-11 or 3-1/2" thick fiberglass) in the walls, install one (1) layer of 5/8" thick gypsum board (drywall) vertically (parallel to studs), tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped. The paneling may then be reinstalled or the walls sanded and painted or wallpapered.

## Above 75 DNL

Remove paneling, install blanket (batt) insulation (R-11 or 3-1/2" thick fiberglass) in the walls, install two (2) layers of 5/8" gypsum board vertically (parallel to the studs) offsetting the top layer at least 10" from the bottom layer, tape the top layer's joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped. The paneling may then be reinstalled or the walls sanded and painted or wallpapered.



## Over 80 DNL

Remove paneling, install blanket (batt) insulation (R-11 or 3-1/2" thick fiberglass) in the walls, install one (1) layer of 1/2" cement board then one (1) layer of 5/8" gypsum board vertically (parallel to the studs) offsetting the top layer (gypsum board) at least 10" from the bottom layer (cement board), tape joints of top layer using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped. The paneling may then be reinstalled or the walls sanded and painted or wallpapered. Cement board and gypsum board can also be applied over existing gypsum board in high noise impacted areas to alleviate transmission of exterior noise. *(If cement board cannot be located, you can use board that is made for the installation of ceramic wall tile.)*



# Ceiling Modifications

Ceiling modifications should be done under two conditions: 1) when a home has an acoustic tile ceiling in a room that does not have a floor above it, and in some cases 2) on the top floor in homes in very highly impacted noise contours (75+ DNL).

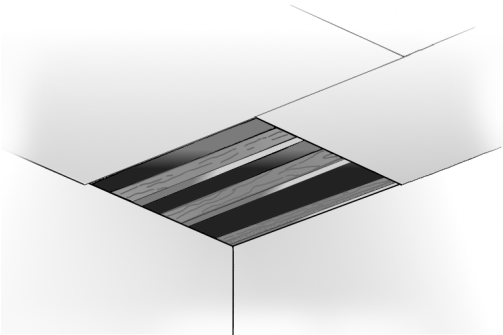
## **Modifications to Ceilings with Acoustical Tile**

The acoustic tile used in most homes decreases noise within the room. However, it is very thin and exterior noise will enter the room due to the lack of mass. If the room has an attic above it, place at least 6" of insulation (R-19 fiberglass) on the attic floor and replace the existing ceiling tiles with "acoustically rated" tiles with a CSTC (sound transmission rating) of no less than 40-44.

If there is no attic above the ceiling, the acoustical tile must be removed and a 5/8" gypsum board ceiling must be installed. (In rooms where the gypsum board (drywall) is also going to be installed, the ceiling should be installed first.) Attach the gypsum board to the roof joists and place blanket (batt) insulation above the gypsum board. Plastic rafter vent channels should be used to make sure that air can circulate between the insulation and the roof deck. Tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped.

## **Modifications to Gypsum Board Ceilings In the 75+DNL Noise Contour**

Additional mass should be added to ceilings on the top floors of homes in the most highly noise impacted areas. Acoustical, even acoustically rated, ceiling tiles should never be used.

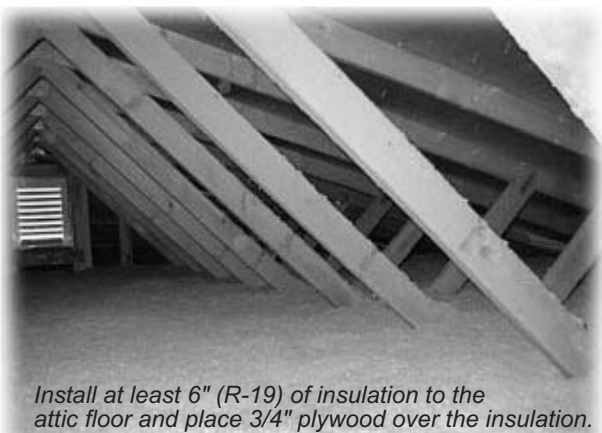




If there is an attic above the room, install at least 6" (R-19) of insulation to the attic floor and place 3/4" plywood over the insulation. In rooms with existing drywall ceilings, install a second layer of 5/8" drywall with 1 5/8" length screws fastened into the floor joists above. (See Detail C1 on page 25.) In rooms with existing acoustic tile ceilings, two (2) layers of 5/8" gypsum board should be installed offset by at least 10". (The first layer should be attached to the floor joists above with 1 1/4" length screws and the second layer should be attached to the floor joists above with 1 5/8" length screws. Tape joints using paper reinforcing tape and an all-purpose joint compound.

Be sure that all corners and edges are taped.

If there is no attic above the room, install one (1) layer of 1/2" cement board over the existing drywall ceiling with 1 5/8" length



*Install at least 6" (R-19) of insulation to the attic floor and place 3/4" plywood over the insulation.*

screws fastened into the wood floor or ceiling joists and one (1) layer of 5/8" gypsum board offset by at least 10" also fastened into the wood floor or ceiling joists with 2 1/2" to 3" length screws. Tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped.

# Insulation

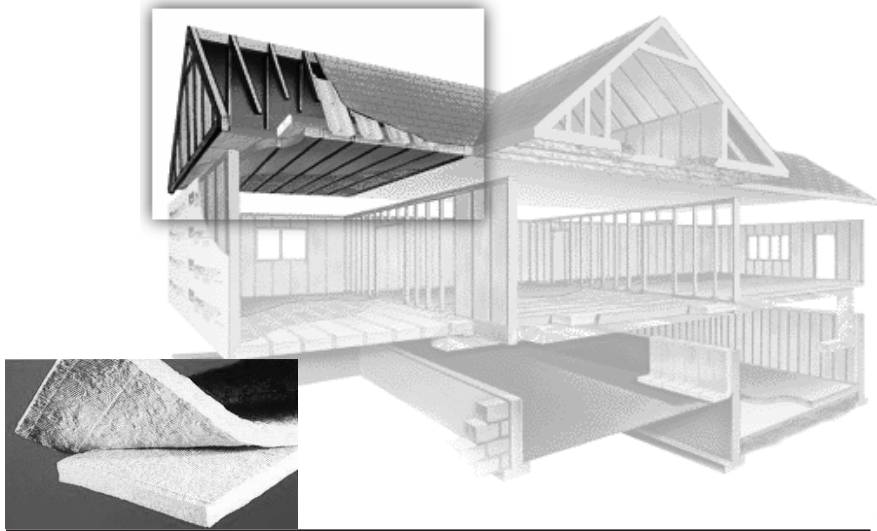
**Insulation:** Adding mass to voids between walls and on attic floors will help diminish noise. (*See Detail I1 on page 26.*)

## Walls

Frame homes require insulation in exterior walls for energy efficiency as well as to decrease exterior noise infiltration. Fiberglass blown-in insulation can be installed from the interior or exterior of the home. In most cases, homeowners will hire an insulation contractor to perform this work. Holes are drilled into the wall near the top and bottom of the wall between each pair of studs. A hollow wand is inserted into the holes through which insulation is blown into the wall. (One hole in the center of the wall can be used, however, you must make sure the wand is long enough to reach the top and bottom of the wall cavity.)

## Attics

The floor of the attic should have at least 6" (R-19) of insulation which may be installed. The addition of 3/8" or 3/4" plywood over the insulation will increase the mass. Attic insulation can be either blown-in or blanket/batt fiberglass insulation.



# Vents

## Attic Vents

You need vents for air circulation. Vents are holes in the exterior of your home through which noise has a direct entry route. Since air is circuitous and noise is not, you need to divert (baffle) the air flow. The location of a vent will dictate the method you should use.

## Wall Vents

Vents located through exterior walls can be baffled by building a plywood enclosure around the vent on the outside of the house. (See *Detail V1 on page 27.*)

## Roof Vents

Vents located on the roof can be baffled by placing insulation on to a piece of 3/4" plywood and attaching the plywood to the roof joists on both sides of the vent. The insulation should be at least 3 1/2" thick. (See *Detail V2 on page 28.*)



## Gable Vents

Vents located in the attic on an exterior wall of the house require a baffle box to be construction of 3/4" plywood lined with 3 1/2" fiberglass insulation. The box will be attached to the exterior wall and open at both ends. An end baffle constructed of 3/4" plywood with 3 1/2" fiberglass insulation will be hung at least 12" from the interior end of the box. (See *Detail V3 on page 29.*)



## Ridge Vents

Continuous vents located at the top ridge of the roof require a 3/4" plywood baffle lined with 2" of fiberglass insulation attached to the rafters. (See *Detail V4 on page 30.*)

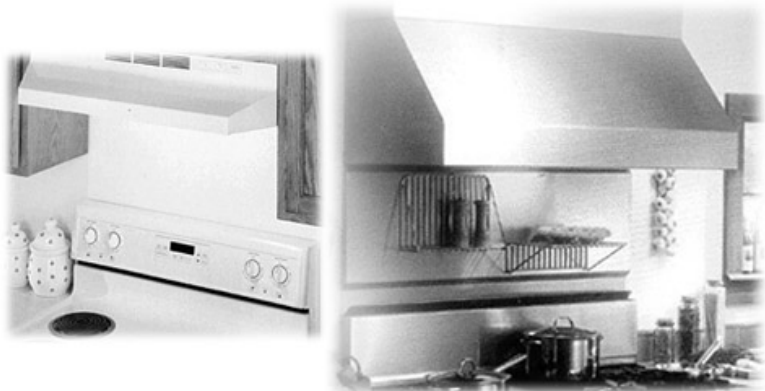


## Exhaust Vents

### Kitchen Exhaust

There are two main types of kitchen exhaust fans requiring different sound insulating modifications.

- 1) **Through-Wall Exhaust:** Remove exhaust fan, insulate wall and patch interior drywall. The exterior can be patched by installing plywood and covering it with the same material as the exterior of the remainder of the home; or by installing plywood and reattaching the existing fan cover. Install a ductless range hood.
- 2) **Ducted Exhaust:** All ducted exhausts should extend to an exterior location. Modifications need to be made only if the ductwork to the exterior is predominantly straight and does not have any elbows (90 degree turns). To reduce sound transmission, the ductwork in the attic should be cut and ductwork elbows should be installed to offset the duct so the sound has a less direct route. You can also reroute the ductwork to exhaust out the eave of the house.



# HVAC Modifications

The acronym HVAC stands for heating, ventilating and air conditioning. The ventilation portion of this section is the major cause of air and noise infiltration. Mechanical systems require vents that are openings to the exterior of the home.

## Central Air Conditioning

The installation of central air conditioning to the entire home will attain the greatest noise reduction during the summer months, since it gives you the ability to keep your doors and windows closed. Air conditioning was not put in the front of this booklet, because it only gives you a seasonal benefit while the previous modifications will produce year-round noise reduction and efficiency.

## Through Wall Heaters and Air Conditioners

Normally these devices are found in room additions because it was less expensive when building the addition to put small independent units in than to extend existing ductwork and upgrade the entire home's mechanical system. However, both of these items require vents through which air and noise have a direct route into your home. The Residential Sound Insulation Program guidelines call for removing these items, filling the wall cavity with insulation and patching the interior and exterior to match the existing materials. Although upgrading your current HVAC system is an expensive remedy to noise, you may want to consider it when the time comes to replace



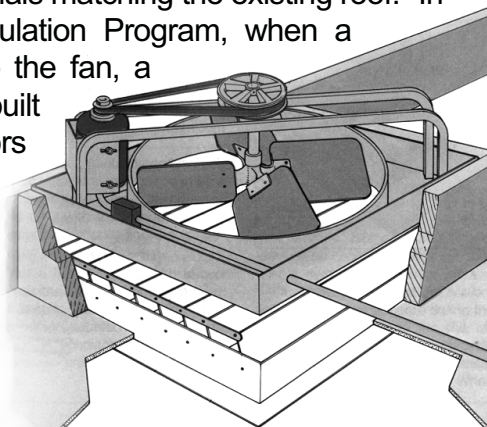
your existing furnace or air conditioning condenser. The cost to upgrade the system for greater output at the time of purchase will be minimal compared to replacing a functional system.

## **Return Air**

Many times homes with central air conditioning still require the use of window air conditioning units on the upper floor due to poor air circulation. In the majority of cases, this is due to the upper floor having only supply ductwork and no return air ductwork. The cost of installing return air ductwork varies greatly depending on the construction of the home. In some instances return air ductwork can be installed in a wall and tied into the existing ductwork for the lower floors. It may be valuable to you to call in a few heating contractors and get proposals on the cost of installing return air ductwork where none exists. The methods used by different contractors and the costs associated with such methods make it advisable to get more than one proposal.

## **Whole House Exhaust Fans**

These fans are found in attics away from view, however, the fan sits in a hole in your roof through which air and noise enter your home. It is recommended that these fans be removed and the opening patched with materials matching the existing roof. In the Residential Sound Insulation Program, when a homeowner wants to keep the fan, a plywood box with doors is built around the fan. The doors must be manually opened before the fan is turned on.





## Miscellaneous

**Mail Slots:** These are holes in the exterior of a home through which air and noise enter. Mail slots located in doors can be removed by replacing the door with a solid core door. If the mail slot is located in a wall of the home, remove the interior framing, insulate the wall and patch the interior drywall. The exterior of the mail slot can be removed and the wall patched to match existing materials, however, sealing the mail slot shut will give the same acoustical benefit.

**Carbon Monoxide Detectors:** It is recommended that when you have finished sealing openings to prevent noise infiltration, a Carbon Monoxide (or CO detector) be installed in the home. Gas appliances and hot water heaters that may need repair, but were not noticed by the residents because of all the air infiltration, may now cause serious problems. To guard against the health risk leaky gas appliances may cause, all homes should have a CO detector, especially those homes receiving new doors and windows.

**Glass Block Windows:** Glass block windows often have small vent or louvered windows in them. This is a community code requirement for air circulation. Unfortunately, there is nothing that can be done to sound insulate the small vent or louvered windows. The small size of the opening will not accommodate an acoustical or a thermo pane window.

**Fire Places:** Fire places provide a direct route for air and noise to enter your home. There is nothing that can be done to seal off this path of air infiltration. Installing tight fitting glass doors in lieu of a fireplace screen will lessen the air infiltration when the fireplace is not in use.

SPACES AROUND THE WINDOW ON ALL SIDES ARE FILLED WITH SOLID WOOD FOR ALL SPACES OVER 1/2" WIDE AND WITH TIGHTLY PACKED INSULATION FOR SPACES UNDER 1/2" WIDE

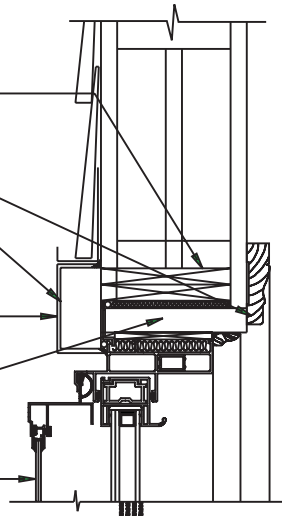
ALL INTERIOR TRIM IS REPLACED WHEN WINDOWS ARE INSTALLED FROM THE INTERIOR OF THE HOUSE

ALL EXTERIOR TRIM IS REPLACED WHEN WINDOWS ARE INSTALLED FROM THE EXTERIOR OF THE HOUSE

ALL EXTERIOR TRIM IS COVERED WITH ALUMINUM CLADDING OR PRIMED AND PAINTED

ALL ROTTEN OR DAMAGED WOOD FRAMING IS REPLACED BEFORE INSTALLATION OF NEW WINDOW

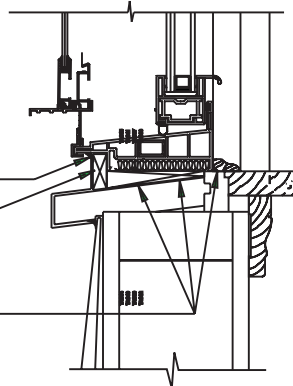
A NEW DOUBLE PANE WITH EXTERIOR STORM (3 PANES TOTAL) WINDOW WITH A SCREEN IS INSTALLED AFTER THE EXISTING WINDOW IS REMOVED



NEW SEALANT IS APPLIED AROUND ENTIRE WINDOW AT EITHER THE EXTERIOR OR INTERIOR SIDE

NEW WEATHERSTOPS ARE PROVIDED WHERE NECESSARY

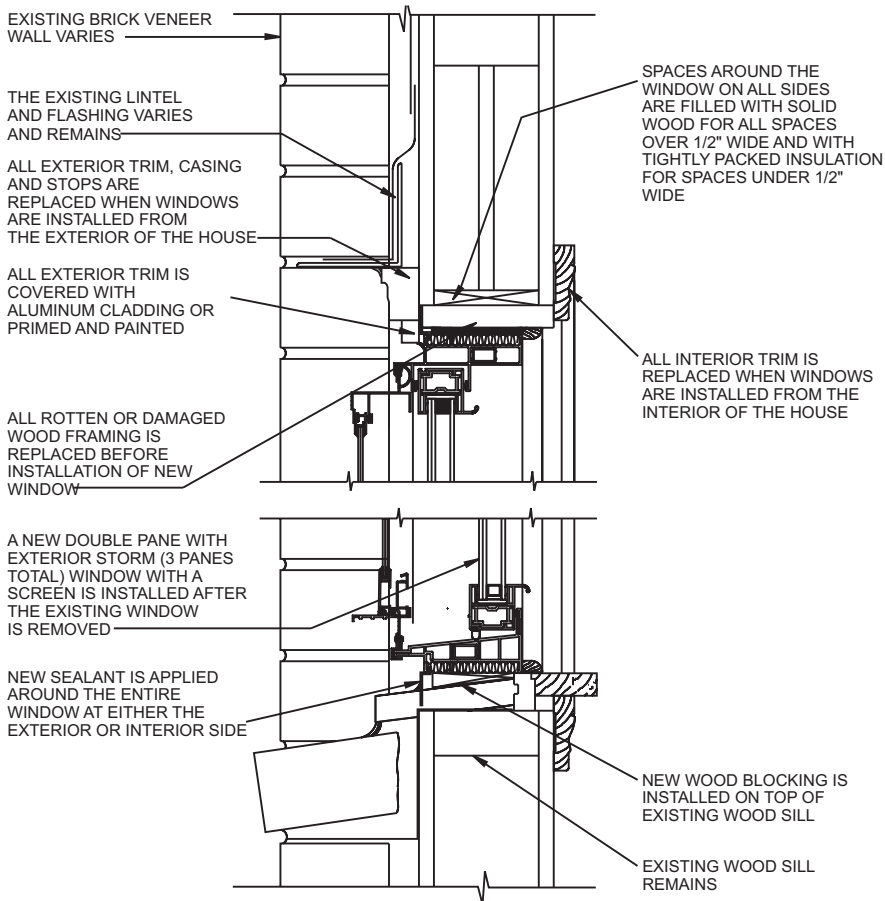
A NEW WOOD SILL, WOOD BLOCKING, INSULATION AND SEALANT ARE INSTALLED



## WINDOW DETAIL

NEW ACOUSTICAL WINDOW IN FRAMED HOUSE WITH EXTERIOR SIDING

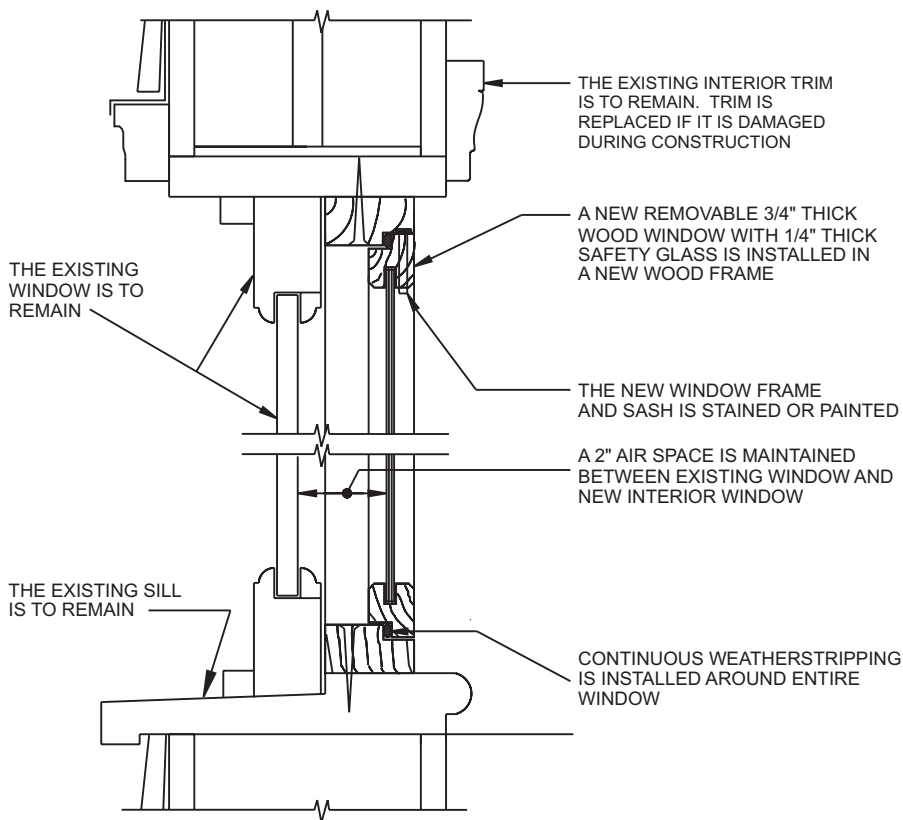
W1



## WINDOW DETAIL

NEW ACOUSTICAL WINDOW IN FRAMED HOUSE WITH BRICK VENEER

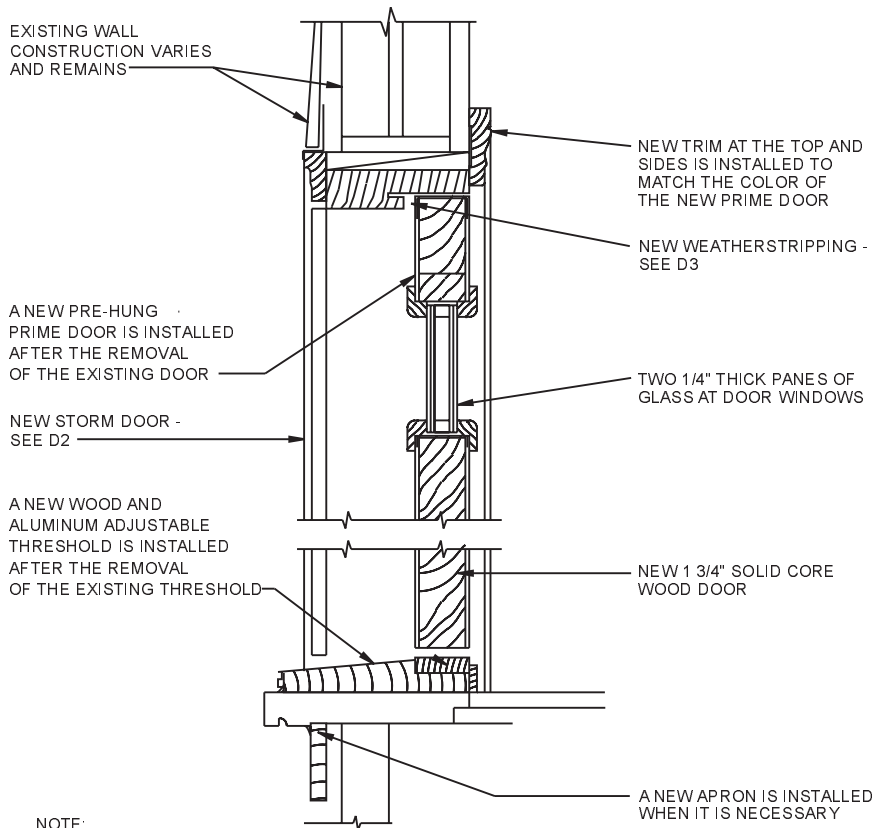
W2



## WINDOW DETAIL

### NEW INTERIOR SECONDARY WINDOW

W3



NOTE:

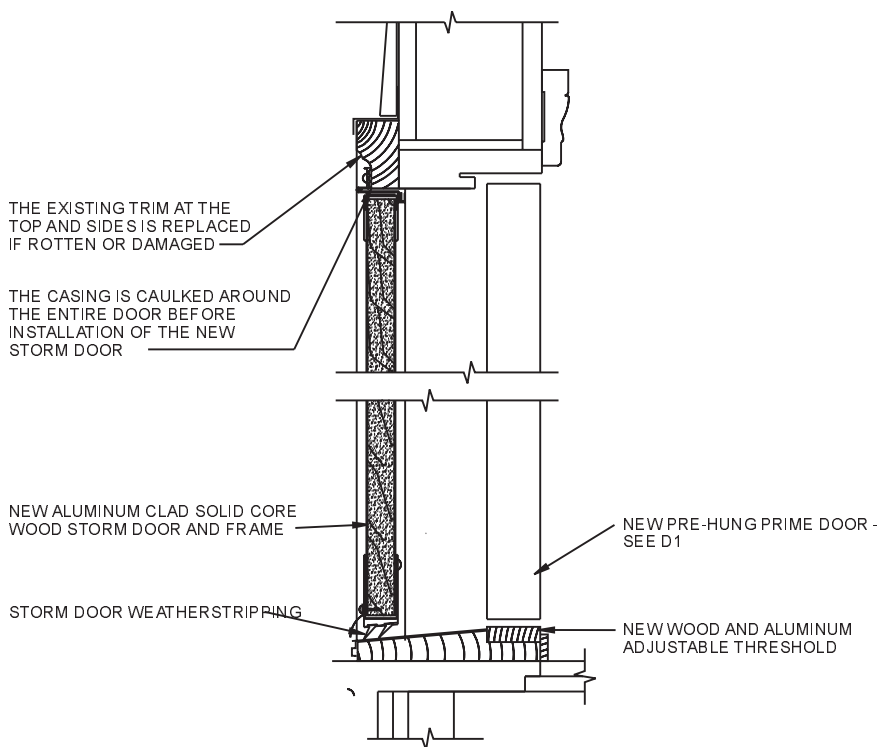
1. HOMEOWNERS HAVE THE OPTION OF HAVING EXISTING HARDWARE RE-INSTALLED OR HAVING NEW HARDWARE INSTALLED.



## DOOR DETAIL

### NEW PRE-HUNG PRIME DOOR

D1

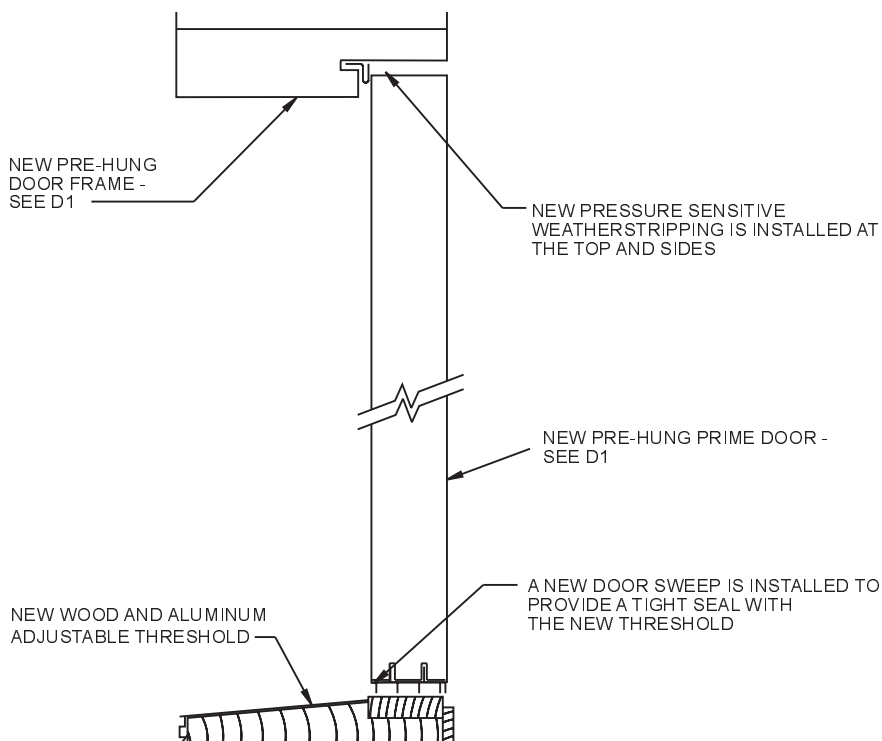


## DOOR DETAIL

### NEW STORM DOOR

D2

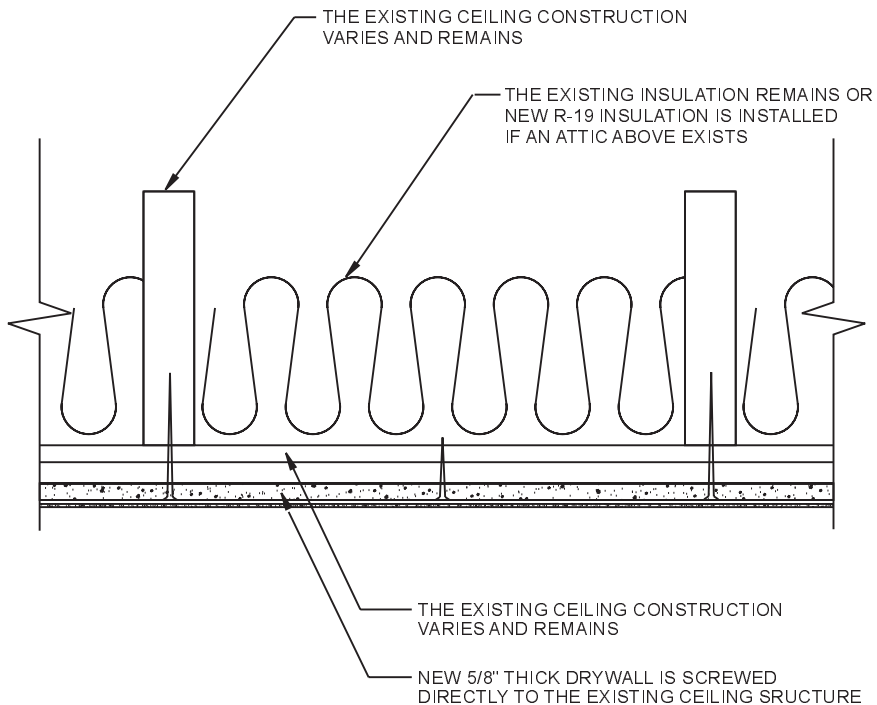




## DOOR DETAIL

NEW WEATHERSTRIPPING IN NEW PRE-HUNG DOORS

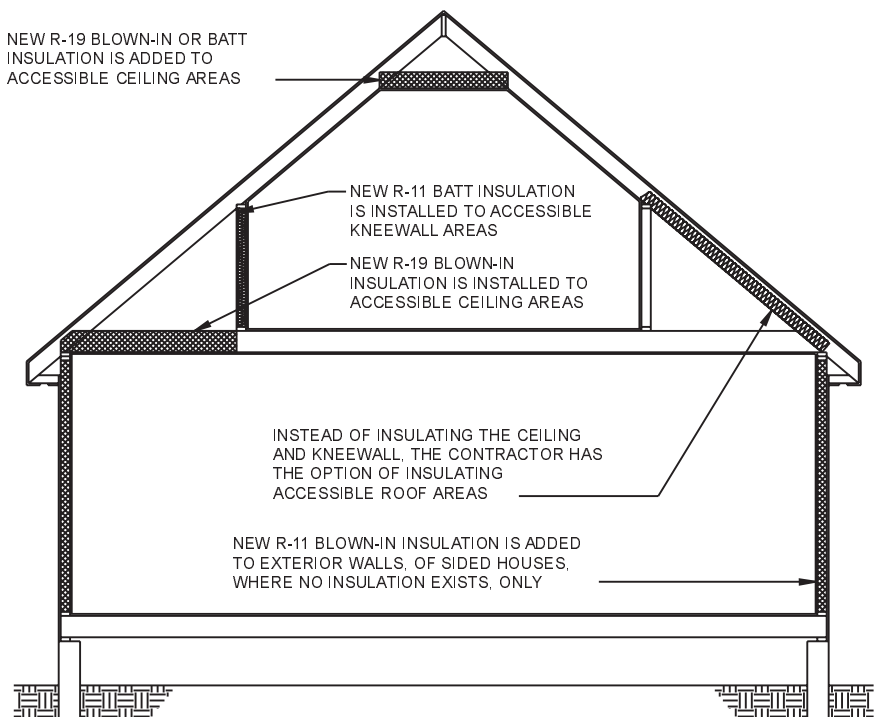
D3



## CEILING DETAIL

NEW DRYWALL OVER EXISTING CEILING

C1



## INSULATION FOR TYPICAL HOME

DIAGRAMMATIC ONLY (NO SCALE)

EXISTING WALL CONSTRUCTION  
VARIES AND REMAINS

NEW FLASHING AND SEALANT  
AS NECESSARY IS INSTALLED

A 3/4" PLYWOOD BAFFLE BOX -  
PRIMED AND PAINTED OR ALUMINUM  
CLAD - IS ATTACHED  
TO THE HOUSE

EXISTING FAN OR  
DUCT OPENING REMAINS

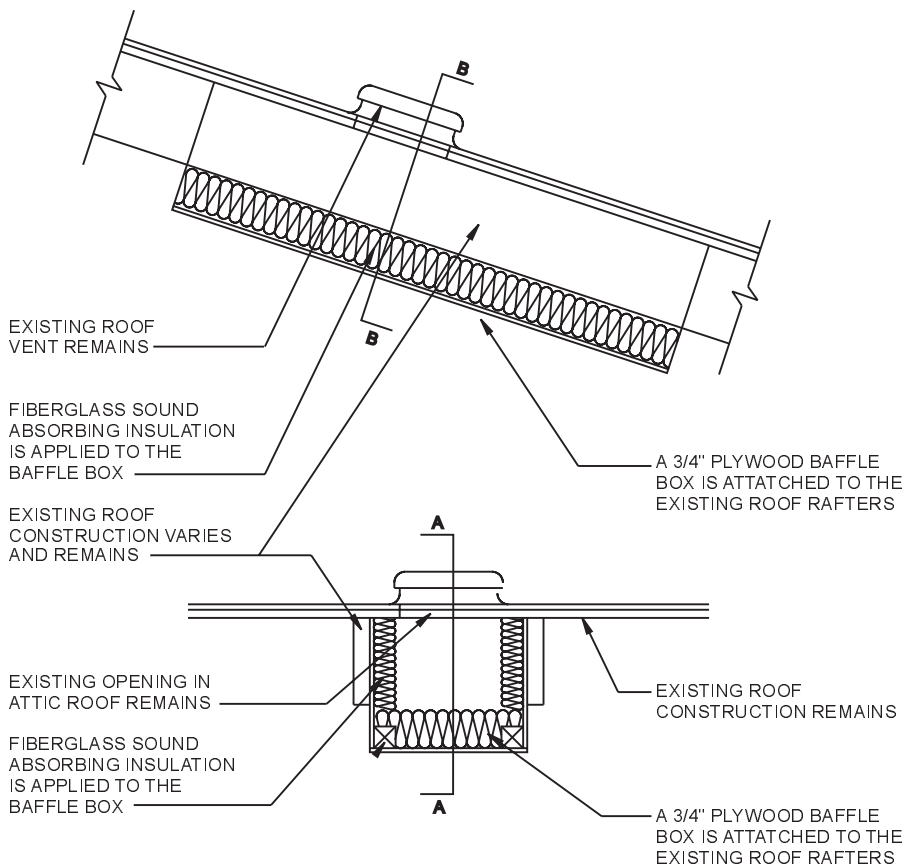
INSECT SCREEN



## VENT DETAIL

NEW WALL VENTILATION BAFFLE

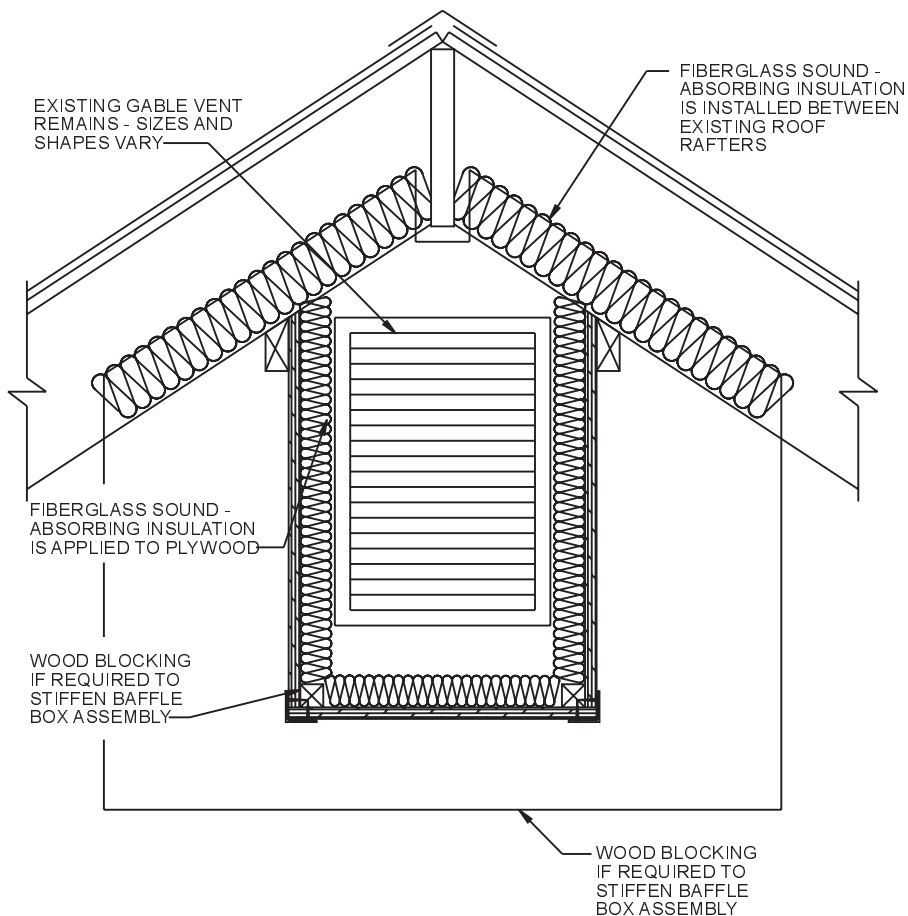
V1



## VENT DETAIL

### NEW ROOF VENT BAFFLE

V2

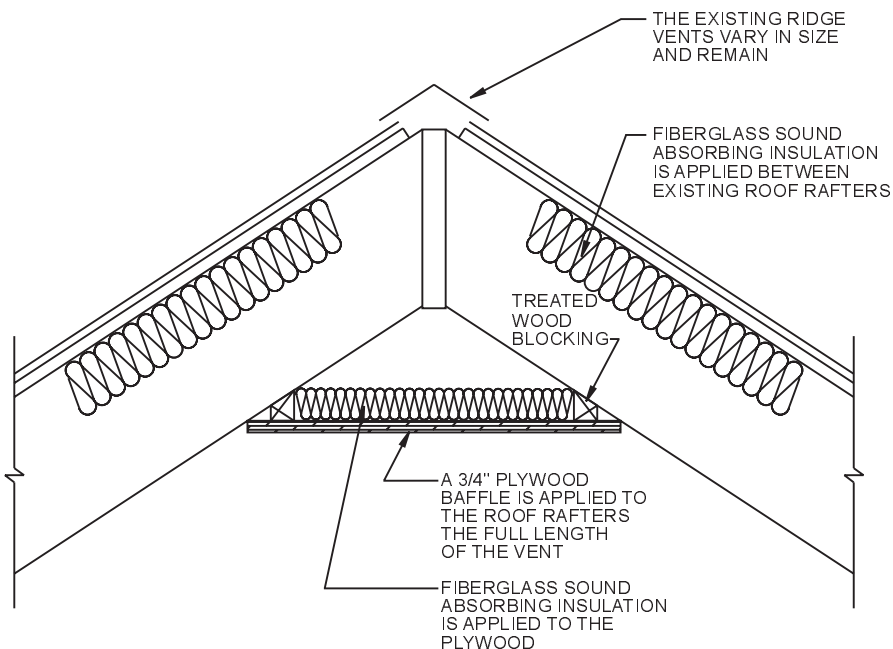


## VENT DETAIL

### NEW GABLE VENT BAFFLE

V3





## VENT DETAIL

NEW RIDGE VENT BAFFLE

V4

# **Suppliers for Residential Sound Insulating Products**

## **Windows**

Harvey Acoustical Windows  
C/o West Roofing & Supply Co.  
1797 Winthrop Dr.  
Des Plaines, IL 60018  
847-795-9378

Republic Windows & Doors, Inc.  
930 W. Evergreen Ave.  
Chicago, IL 60622  
312-932-8000

## **Storm Windows**

Mon-Ray, Inc.  
8224 Olson Memorial Hwy.  
Minneapolis, MN 55427-4713  
800-544-3646

Republic Windows & Doors, Inc.  
930 W. Evergreen Ave.  
Chicago, IL 60622  
312-932-8000

Peerless Products, Inc.  
15500 College Blvd.  
Lenexa, KS 66219  
800-279-9999

Sound Control Systems, Inc.  
A Division of Larson Industries  
Brookings, SD  
800-334-1328

## **Storm Doors**

Hess-Armaclad Doors  
P.O. Box 127, Rte. 997  
Quincy, PA 17247  
800-541-6666

Sound Control Systems, Inc.  
A Division of Larson Industries  
Brookings, SD  
800-334-1328

Mon-Ray, Inc.  
8224 Olson Memorial Hwy.  
Minneapolis, MN 55427-4713  
800-544-3646

Whisper-Like  
P.O. Box 2949  
Toledo, OH 43606  
800-227-8246

## **Patio/Sliding Glass Doors**

Mon-Ray, Inc.  
8224 Olson Memorial Hwy.  
Minneapolis, MN 55427-4713  
800-544-3646

Sound Control Systems, Inc.  
A Division of Larson Industries  
Brookings, SD  
800-334-1328

Republic Windows & Doors, Inc.  
930 W. Evergreen Ave.  
Chicago, IL 60622  
312-932-8000

The above manufacturers have acoustical products that meet the specifications of the City of Chicago's Residential Sound Insulation Program and can put you in touch with local distributors.

**Updated April 5, 2002**